

### Claims

What is claimed is:

1. A planar optical waveguide tap substantially absent of polarization dependent loss from an input end to an output end, comprising:

a first optical waveguide for supporting a first polarization mode and a second polarization mode when light is launched into the input end of said waveguide;

a second optical waveguide having at least a coupling portion adjacent and proximate to the first optical waveguide for receiving a portion of light launched into the first optical waveguide into the second optical waveguide, said coupling portion, inherently coupling light in a substantially polarization dependent manner, such that a first polarization mode couples significantly more strongly than a second polarization mode into the second optical waveguide from the first optical waveguide;

a portion of the second optical waveguide distinct from the coupling portion having at least one predetermined bend therein which allows light of the first polarization mode to radiate out of the bend portion of the waveguide into a cladding about the bend portion with greater efficiency than light of the second polarization mode thereby effectively nulling a polarization dependence that occurs from the coupling portion, light which remains with the second optical waveguide after passing through the bend portion exiting the output end.

2. A planar optical waveguide system, including a first optical waveguide for supporting a first polarization mode and a second polarization mode and having a second optical waveguide including at least a coupling portion adjacent and proximate to the first optical waveguide for tapping a portion of light launched into the first optical waveguide into the second optical waveguide, wherein in operation, the first polarization mode of the light that has coupled into the second optical waveguide from the first optical waveguide experiences an insertion loss  $I_{11}$ , substantially less than the insertion loss,  $I_{12}$ , of light in the second polarization mode coupled into the second optical waveguide,

wherein an insertion loss difference  $I_{\Delta} = I_{21} - I_{11}$ , with  $I_{\Delta} > 0$ , exists, the improvement comprising:

a portion of the second optical waveguide having at least one bend therein, thereby causing light in the first polarization mode, to radiate out a core of said bend portion with greater efficiency than light in the second polarization mode, so as to substantially null the insertion loss difference  $I_{\Delta}$ .

3. A polarization compensated planar waveguide branch comprising:  
a planar optical trunk waveguide for transporting a linearly un-polarized optical signal having TE and TM modes;

a planar optical branch waveguide, capable of supporting TE and TM modes optically coupled to the trunk waveguide such that at least a portion of an optical signal propagating within the trunk waveguide will couple into the branch waveguide with an imbalance, having stronger TM mode coupling than TE mode coupling for the at least the portion of the optical signal which couples into the branch waveguide from the trunk waveguide; wherein a portion of said branch waveguide downstream from a region where coupling takes place between the trunk and branch waveguides or a waveguide portion optically coupled thereto, for receiving the at least a portion of the optical signal, has at least a predetermined bend with a predetermined radius for compensating for an imbalance in the TM and TE mode caused by light optically coupling into the branch from the trunk waveguide.

4. In a chip for transporting a plurality of optical signals having a plurality of separate trunk waveguides within a same substrate, each having a branch waveguide optically coupled thereto by separate coupling regions, each optical coupling at each coupling region inducing an imbalance in TE and TM mode coupling for light coupling from each trunk to a respective branch waveguide; the improvement comprising:

each branch waveguide having a waveguide region downstream from said coupling region, having at least a predetermined bend therein, for offsetting and compensating for said imbalance to effectively null said imbalance in TE and TM modes.